WHAT IS CLAIMED IS:

1. An electrical lead for connection between a higher temperature and a lower temperature, said lead comprising:

a first buss at said lower temperature, said first buss having a cross-section area A for current flow therethrough;

a second buss at said higher temperature;

n first leads each having a first end and a second end and connected at said first end in parallel to said first buss, each said lead having a cross-section area for current flow, the sum of cross-section areas of n-1 of said parallel first leads being less than said cross-section area A;

n parallel second leads each having a first end and a second end and connected in parallel at said first end to said second buss, each said lead having a cross-section area for current flow;

a controllable interface unit connected between said first leads and said second leads, said interface unit selectively and reversibly connecting electrically said second end of any one of 0, 1, 2.....n of said first leads to said second end of a respective one of said second leads, in use current flowing between said busses through said connected first and second leads, in use heat flowing from said second higher temperature buss to said first lower temperature buss through said connected leads, said interface unit selectively and reversibly disconnecting said connected leads electrically with a physical gap between said second ends of said disconnected leads, electrical current and conductive heat flow being blocked across said gap.

2. An electrical lead as in claim 1, wherein the sum of cross-section areas of said n first leads is approximately equal to A.

3. An electrical lead as in claim 1, wherein said interface unit includes at least one solenoid actuated electrical switch to connect one said first lead to one said second lead.

4. An electrical lead as in claim 1, wherein said interface unit includes at least one conductive liquid switch to connect one said first lead to one said second lead.

5. An electrical lead as in claim 1, wherein said interface unit includes at least one of a linear actuator and a rotational actuator, each actuator having an input terminal and an output terminal and having at least n physical positions for reversibly connecting said n first leads to said second leads.

6. An electrical lead as in claim 4, wherein said conductive liquid is selected from a group consisting of mercury, cesium, gallium, and rubidium.

7. An electrical lead as in claim 1, further comprising a main electrical conductor fixedly connected between said first buss and said second buss, a cross-section for current flow through said main conductor and through n-1 of said first conductors being less than A.

8. An electrical lead as in claim 1, wherein said lower temperature is cryogenic (less than 200 K) and said first conductor is at least one of thermally insulated and maintained in a thermally insulated container.

9. An electrical lead as in claim 1, wherein said interface unit is maintained in a vacuum in an insulated container, said first leads extending to said insulated container, said vacuum reducing convective heat transfer to said first leads from said higher temperature.

10. A method for reducing heat transfer through an electrical lead that extends between a higher temperature and a lower temperature, comprising the steps:

a) splitting a first buss, having a current flow cross section A, at said lower temperature into n parallel first leads;

b) splitting a second buss at said higher temperature into n parallel second leads;

c) making the sum of cross-sections for current flow of n-1 of said n first leads less than the cross-section A of said first buss;

d) providing an interface unit between said first and second leads that in use selectively, reversibly, and electrically can connect each said first lead to a respective one of said second leads;

e) providing a physical gap between unconnected first and second leads at said interface unit, said gap blocking electrical current and conductive heat transfer through said unconnected leads;

f) varying the quantity of said connected leads to make the sum of current flow cross section areas of said connected leads vary directly with the current flow through said interface unit, in use said current flow area ranging from 0 to approximately A as total current ranges from 0 to a maximum value through said first and second leads.

11. A method as in claim 10, wherein said interface unit in use connects any one of 0, 1, 2.....n of said first leads to said respective second leads.

12. An electrical lead for connection between a higher temperature and a lower temperature, said lead comprising:

a first buss at said lower temperature, said first buss having a cross-section area A for current flow therethrough;

a second buss at said higher temperature;

n parallel first leads each having a first end and a second end and connected at said first end to said first buss, each said lead having a cross-section area for current flow;

n parallel second leads each having a first end and a second end and connected at said first end to said second buss, each said lead having a cross-section area for current flow;

a controllable interface unit for selectively and reversibly connecting first leads each to a respective second lead at said second ends, the quantity of connected leads being variable in use in said interface unit in direct relationship to a magnitude of electrical current flowing through said first and second leads and said busses, a sum of cross section areas of connected first leads for any range of buss current being equal to or less than approximately A, unconnected first and second leads having a physical gap between said second ends, current and conductive heat flow

being blocked across said gap, in use said connected current flow area in said interface unit ranging from 0 to approximately A as total current ranges from 0 to a maximum value through said first and second leads.

13. A method for reducing heat transfer through an electrical lead that extends between a higher temperature and a lower temperature, comprising the steps:

a) splitting a first buss, having a current flow cross section A, at said lower temperature into n parallel first leads;

b) splitting a second buss at said higher temperature into n parallel second leads;

c) making the respective cross-sections for current flow of said n first leads not greater than the cross-section A approximately of said first buss;

d) providing an interface unit between said first and second leads that in use selectively, reversibly, and electrically can connect each said first lead to a respective one of said second leads;

e) providing a physical gap between unconnected first and second leads at said interface unit, said gap blocking electrical current and conductive heat transfer through said unconnected leads;

f) varying the quantity of said connected leads to make the sum of current flow cross section areas of said connected leads vary directly with the current flow through said interface unit, in use said current flow area ranging from 0 to approximately A as total current ranges from 0 to a maximum value through said first and second leads.

14. A method as in claim 13, wherein said interface unit in use connects any one of 0, 1, 2.....n of said first leads to said respective second leads.